



# AGRICULTURAL EXTENSION IN AGROFORESTRY ANDEMPowerMENT OF RURAL COMMUNITIES, INSOUTHEASTERN BRAZIL

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## **AGRICULTURAL EXTENSION IN AGROFORESTRY ANDEMPowerMENT OF RURAL COMMUNITIES, INSOUTHEASTERN BRAZIL.**

Eliana CARDOSO-LEITE\*, Fátima C.M. PINÃ-RODRIGUES\*\*, Edgar Alves COSTA JÚNIOR\*\*\*, Pedro K. GONÇALVES\*\*\*\*, Diego S. PODADERA\*\*\*\*\*, Naishi B. RUAS\*\*\*\*\*

\* UFSCar- Federal University of Sao Carlos, campus Sorocaba  
Rodovia João Leme dos Santos, km 110, CEP 18052-780  
Sorocaba / São Paulo State, Brazil  
55 15 3229 5956  
cardosoleite@yahoo.com.br, eliana.leite @ ufscar.br

\*\* UFSCar- Federal University of Sao Carlos, campus Sorocaba  
Rodovia João Leme dos Santos, km 110, CEP 18052-780  
Sorocaba / São Paulo State, Brazil  
55 15 3229 5956  
fpina@ufscar.br

\*\*\* UFSCar- Federal University of Sao Carlos, campus Sorocaba  
Rodovia João Leme dos Santos, km 110, CEP 18052-780  
Sorocaba / São Paulo State, Brazil  
55 15 3229 5956  
edgarcj@yahoo.com.br

\*\*\*\* UFSCar- Federal University of São Carlos, campus Araras  
Rodovia Anhanguera, km 174 - SP-330, CEP 13600-970  
Araras - São Paulo - Brazil  
55 19 3543-2600  
pedrokaw@gmail.com

\*\*\*\*\* UFSCar-Federal University of São Carlos, campus Araras  
Rodovia Anhanguera, km 174 - SP-330, CEP 13600-970  
Araras - São Paulo - Brazil  
55 19 3543-2600 or 55 3543-2601  
diegopodadera@gmail.com

\*\*\*\*\* ITESP- Foundation Land Institute of São Paulo,  
Rua Colonel Jose R Prestes 113 - Centro, Sorocaba, Brazil, CEP: 18035-625  
55 15 232-0860  
naishi\_ruas@yahoo.com.br

\* , \*\* - Project researchers, \*\*\* - Technical coordinator of the rural project activities , \*\*\*\* - Project facilitator, \*\*\*\*\* - Trainees of the project  
All the same address of first author.

#### **Abstract:**

This paper aims to promote the dissemination of agroforestry systems in southeastern Brazil, through techniques of innovative extension in order to stimulate small family farmer in the transition from traditional agriculture towards agroecology, based on agroforestry systems that insure the increase of product diversity and income, associated to ecological sustainability. The project is based on participatory methodologies, such as diagnosis, reflection, discussion and training of social pacts. The project is being developed in rural settlements around the National Forest of Ipanema in Iperó/SP, Brazil. . Of the total of 150 families, about 40 participated in the project. Six young people were selected from the community to act as multiplier monitors. Exchange visits allowed them to share real experiences with rural farmers and to observe community organization and production in agroforestry. From a participatory diagnosis, farmers cited the species they would like to plant. Since only exotic species were cited in the diagnosis, the project prepared an illustrative material with native species. Planning workshops were held where farmers laid down the species and combinations that they would like to deploy. Thereafter, the demonstration units were deployed in the monitors' areas with exotic agricultural species and native species of medium and long cycle. It is believed that the project objectives have been achieved because, currently, several new voluntary initiatives to diversify production and deploy agroforestry are seen.

**Keywords:** agroecology, agroforestry, agricultural extension innovation, empowerment, family farming.

#### **Résumé :**

Ce document vise à promouvoir la diffusion des systèmes agroforestiers dans le sud du Brésil, grâce à des techniques novatrices d'extension afin de stimuler les agriculteurs petite famille dans la transition de l'agriculture traditionnelle vers l'agro-écologie, sur la base des systèmes d'agroforesterie, qui assurent l'augmentation de la diversité des produits et des revenus, associés à la durabilité écologique. Le projet est basé sur des méthodologies participatives, telles que le diagnostic, la réflexion, la discussion et de formation des pactes sociaux. Le projet est en cours d'élaboration dans les agglomérations rurales autour de la Forêt nationale d'Ipanema en Iperó / SP, Brésil. . Sur un total de 150 familles, environ 40 d'entre eux ont participé au projet. Six jeunes ont été sélectionnés de la communauté à agir comme multiplicateurs moniteurs. Visites d'échange leur permettant de partager des expériences concrètes entre les agriculteurs et d'observer l'organisation communautaire et la production dans l'agroforesterie. D'un diagnostic participatif, les agriculteurs citent les espèces qu'ils aimeraient utiliser. Comment ont été cités que des espèces exotiques dans le diagnostic, le projet a préparé un matériel d'illustration avec des espèces indigènes. Des ateliers de planification ont eu lieu où les agriculteurs ont défini les espèces et les combinaisons qui souhaitent déployer. Par la suite, les unités de démonstration ont été déployées dans les domaines de la surveillance, avec des espèces exotiques de cycle court agricoles et des espèces indigènes du cycle moyen et long terme. On croit que les objectifs du projet ont été atteints parce que, actuellement, plusieurs nouvelles initiatives visant à diversifier la production et le déploiement de l'agroforesterie qu'ils voient être faite volontairement.

**Mots clés :** l'agriculture agro-écologie, l'agroforesterie, de l'innovation de vulgarisation agricole, l'autonomisation de la famille

## **INTRODUCTION**

In southeastern Brazil, especially in areas of seasonal forest and savanna, there exist few experiences with agroforestry systems. In addition, in most cases, the projects are implemented with public or private support. However, the activities end up "dying" when the

projects are finished. The main contribution of this work is to involve small settled farmers in the experiment and management of their properties, encouraging them to organize themselves and become autonomous in the research of new projects and social organization of the production and commercialization of their products, associated to ecological management.

This paper aims to promote the dissemination of agroforestry systems (AFS) in southeastern Brazil, through techniques of innovative extension in order to stimulate small family farmers to transit from traditional agriculture towards agroecology (ALTIERI, 1989; FARRELL & ALTIERI, 2002) based on agroforestry systems that insure the increase of product diversity and income, associated to ecological sustainability (CAPORAL & COSTABEBER, 2000). Beside this, our purpose also is to stimulate young farmers to become local multipliers, in order to integrate them in institutions of rural technical assistance at the same time that they are introduced to this new methodology of research work and participative action.

## **1.METHODOLOGY**

The project is being developed in rural settlements around the National Forest of Ipanema (BRASIL, 2000) which is a typical example of conflict between human demands and the need to preserve the native ecosystems in Iperó/SP, Brazil. The project is based on participatory methodologies (FREIRE, 1975; 1983; VERDEJO, 2006), such as diagnosis, reflection, discussion and training of social pacts. There are 150 families of small farmers the rural settlements. From these families were selected young students as "multiplier agents" to interact directly with others families and to monitor demonstrative areas. In order to develop the project, the following procedures were established: (a) establishment of a participative council to implement, monitor and coordinate the project; (b) diagnosis about production systems; (c) continuous capacitation of the young monitors; (d) visits to other communities with agroforestry systems established and with commercial and organizational experiences; (e) planning and organization of demonstrative unit plots planted, designed and monitored by the multiplier agents.

## **2. RESULTS AND DISCUSSION**

All internal administration of the project was established to be equally developed by local inhabitants, farmers and families, universities and local and regional institutions of technical assistance. With this aim, in the first meeting was established the Project Management Council (Figure 1), which comprises all the institutions involved and the local members of the community. It were also selected six local youths to act as "multipliers" of the project. These young people receive a small grant by the project. Of the total of 150 families, about 40 participate in the project. The entire project team and the young monitors were trained to apply participatory methodologies and surveys that were carried out in training workshops.

Exchange visits allowed them to share real experiences with rural farmers and to observe community organization and production in agroforestry. There were two exchange visits, one to Paraty/ RJ and the other to Barra do Turvo/ SP (Figure 2). About 60 (sixty) producers and / or family members participated in the visits. It was observed that these activities achieved a positive result in that they were highly encouraging, favoring the discussion about real-case and other production and commercialization systems. In addition to the 40 families that participate in the project, others showed interest in participating more actively in the project after the exchange.

Local diagnoses of agricultural systems indicated that many farmers were interested in increased species diversity on their properties, especially through the introduction or increase of production of fruit trees (Table 1). However, most of them did not know about the cultivation and use of native fruit tree species, and habitually cited only exotic ones despite the natural occurrence of many of the native ones in the surroundings of their properties (COSTA Jr et al., 2009). Of the total species indicated, 66,6% were for fruit production, 16,7% for wood production, and 16,7% for the production of non wood forest products.

After the exchange visits and the local diagnoses farmers, the multiplier agents, monitors and facilitators (project team) conducted field days in order to establish the demonstration units (DU). Until now 60 DUs were established (plots of 100m<sup>2</sup>) and to improve the soil conditions for the agroforestry, leguminous plants were planted in order to favor nitrogen fixation and to protect the soil. The species of leguminous used was jack bean (*Canavalia ensiformis*), pigeon pea (*Cajanus cajan*), velvet bean (*Mucuna aterrina*) and lupinus (*Lupinus sp.*) among others.

According to the farmers' desire to diversify production, the technical project team suggested the use of native species. Farmers have reacted positively, but said they did not know these species (Figura 3).

Due to solicitation by farmers and monitors, didactic illustrative material (play cards) with native species of fruit, wood and others was prepared for the workshop planning the agroforestry models to be implanted. This material was constructed by one student of biology/education with orientation from the project team (Figura 5).

In this workshop the species to be planted were defined, as well as the structural arrangement of the agroforestry systems. All this was discussed in order for the composition and structure of the AFS to represent the expectations of the farmers (Figure 3). This is based on the principle that the project is a process to facilitate the "construction" of knowledge within the community, encouraging it to introduce experiments and innovation in their traditional production systems.

The result of the planning workshop is presented in (Table 2, Figure 4), where can see that species of short, medium and long term were mentioned. Most short-term species were agricultural species (exotic), but most of medium and long term species were native.

This demonstrates that the farmers' knowledge about native species experienced an improvement of quality, showing that the strategy of using a playful teaching material was efficient (Figure 5).

After this workshop, the implantation of DUs was started. Six DUs were implanted in the monitors' areas, and in addition four experimental areas were installed (Figure 6).

From the results of the planning workshop, a list of species was drawn up for the acquisition of species. Where it was impossible to find the species for purchase, we used other species with the same characteristics. Table 2 shows the species effectively implemented in the monitors' DUs.

In all cases, next to the DUs, witness areas were left without any management, so as to build areas for comparison. In the future, indicators of environmental, economic and social sustainability assessment will be used for the DUs of agroforestry. Indicators of sustainability in agroforestry systems, since much time has been studied (Torquebiau, 1989, 1992), but in this study, these indicators will be constructed together with producers, in a participatory manner, and will apply in all DUs.

Due to the six DUs and the four experimental sites, other producers began a process of implementation of AFSs, or other initiatives to diversify production with native species, as shown in Figure 7.

It can be concluded that the strategies adopted were accurate and efficient for the proposed objectives. The creation of a Management Council has ensured transparency in the use of resources and action planning.

Exchange visits to other AFSs created the certainty in the farmers that "alternative production systems" may be viable.

The choice of community youths as monitors was important because they are greater dreamers, idealists and tend to be less fearful in relation to innovations in production, than older farmers.

The constant process of training of monitors ensured that they acquired knowledge, applied it in their properties, and spread the proposed agroforestry.

The participatory methodology used in the workshops and meetings with local farmers helped them to expand their knowledge about native species and diversification of production.

Due to the experienced planning process, where they had total freedom to express their concerns and where these were respected, many monitors and farmers are today more autonomous and initiated proceedings to diversify production after the project activities

However, the interaction of the project with the institutions of rural extension and technical assistance has been decreasing with time, and is currently very weak. These agencies often have positions contrary to the project despite being part of the Management Council, and encourage producers to continue in the conventional system, always trying to give producers "ready revenue" and/or "miraculous species".

Since this project believes in the empowerment of these communities, it is most important to invest in their knowledge and surely the project has reached this goal.

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**Table 1. Species indicated in initial diagnosis. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.**

Species	Economic use	Native N, Exotic E	Percentage of farmers
<b>FRUITS</b>			<b>66,6%</b>
Orange – <i>Citrus sp.</i>	Food	E	32.3%
Mango – <i>Mangifera indica</i>	Food	E	25.8%
Tangerine – <i>Citrus sp.</i>	Food	E	22.6%
Lemon – <i>Citrus sp.</i>	Food	E	19.4%
Jabuticaba- <i>Myrciaria trunciflora</i>	Food	N	19.4%
Lychee – <i>Litchi chinensis</i> Sonn.	Food	E	19.4%
<b>WOOD</b>			<b>16,7%</b>
Eucalipto- <i>Eucaliptus sp</i>	Wood	E	9.7%
Ipê - <i>Handroanthus avellanadae</i>	Wood	N	9.7%
Cinnamom - Lauraceae	Wood	N	6.5%
<b>OTHER non timber forest products</b>		N or E	<b>16,7%</b>
<b>DIVERSITY</b>		N or E	<b>58.1%</b>

**Table 2. Species planted in demonstration units (DUs) in monitors' areas. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.**

N.º	Popular Name	Cientific Name	Occurrence		Uses					Term		
			Native	Exotic	Fruit	Timber	Honey	Functional	NTPF	Short	Medium	Long
1	Abóbora	<i>Cucurbita pepo</i>		X	X					X		
2	Acerola	<i>Malpighia emarginata</i> DC.		X	X						X	
3	Açaita-cavalo	<i>Luehea divaricata</i> Mart.	X				X				X	
4	Ameixa	<i>Prunus salicina</i>		X	X						X	
5	Amora Preta	<i>Morus alba</i> L.	X		X			X		X		
6	Araçá	<i>Psidium araca</i> Raddi	X		X						X	
7	Araticum	<i>Rollinia insignis</i> R. E. Fr.	X		X				X			X
8	Aroeira	<i>Schinus terebinthifolia</i> Raddi	X				X				X	
9	Atemóia	<i>Annona cherimola</i>		X	X						X	
10	Banana	<i>Musa ssp.</i>		X	X			X		X		
11	Cajá	<i>Spondias mombin</i> L.	X		X				X		X	
12	Caju	<i>Anacardium occidentale</i> L.	X		X						X	
13	Canafístula	<i>Peltophorum dubium</i>	X				X	X			X	
14	Canela	<i>Nectandra lanceolata</i>	X			X			X			X
15	Capim Roxo	<i>Pennisetum purpureum</i>		X				X		X		
16	Caqui	<i>Diospyros kaki</i>		X	X					X		
17	Cedro	<i>Cedrela fissilis</i> Vell.	X			X						X
18	Copaíba	<i>Copaifera langsdorffii</i> Desf.	X						X			X
19	Crandiúva	<i>Trema micrantha</i> (L.)	X					X			X	
20	Crotalária	<i>Crotalaria spp.</i>		X	X			X		X		
21	Embaúba	<i>Cecropia pachystachya</i> Trec.	X					X	X		X	
22	Feijão de Porco	<i>Canavalia ensiformis</i> DC		X				X		X		
23	Feijão Guandú	<i>Cajanus cajan</i>		X	X			X		X		
24	Figo	<i>Ficus carica</i> L.		X	X					X		
25	Fruta do Conde	<i>Rollinia mucosa</i>		X	X						X	
26	Girassol	<i>Helianthus annuus</i>		X			X	X		X		
27	Goiaba	<i>Psidium guayava</i>	X		X						X	
28	Graviola	<i>Annona muricata</i> L.	X		X						X	
29	Guabiroba	<i>Campomanesia schlechtendahlana</i>	X		X				X		X	
30	Guapuruvu	<i>Schizolobium parahyba</i>	X			X	X	X	X		X	
31	Guarantã	<i>Esenbeckia leiocarpa</i>	X			X						X
32	Ingá-de-metro	<i>Inga edulis</i> Mart.	X				X	X			X	
33	Ipê-roxo	<i>Handroanthus avellaneda</i>	X			X	X					X
34	Jabuticaba	<i>Myrciaria jaboticaba</i> (Vell.)	X		X				X			X
35	Jaca	<i>Artocarpus heterophyllus</i>		X	X							X
36	Jambo	<i>Eugenia malaccensi</i>	X		X				X		X	
37	Jaracatiá	<i>Jacaratia spinosa</i>	X		X				X	X		
38	Jatobá	<i>Hymenaea courbaril</i> L.	X		X	X			X			X
39	Jenipapo	<i>Genipa americana</i> L.	X		X				X		X	
40	Laranja	<i>Citrus aurantium</i> L.		X	X		X				X	
41	Lichia	<i>Litchi chinensis</i> Sonn.		X	X						X	
42	Limão	<i>Citrus spp.</i>		X	X					X		
43	Macadâmia	<i>Macadamia integrifolia</i>		X	X							X
44	Mamona	<i>Ricinus comunis</i> L		X				X		X		
45	Mandioca	<i>Manihot sculenta</i>		X	X					X		
46	Manga	<i>Mangifera indica</i> L		X	X						X	
47	Margaridão	<i>Tithonia diversifolia</i>		X			X	X		X		



Tab. 2. Continued

48	Mixirica	<i>Citrus deliciosa</i> Tenore		X	X						X	
49	Mulungu	<i>Erythrina speciosa</i> Andrews	X					X	X		X	
50	Mutambo	<i>Guazuma ulmifolia</i> Lam.	X		X				X			X
51	Palmito Jussara	<i>Euterpe edulis</i> Mart.	X		X				X		X	
52	Pau-marfim	<i>Balfourodendron riedelianum</i>	X			X						X
53	Peroba rosa	<i>Aspidosperma polyneuron</i>	X			X						X
54	Pitanga	<i>Eugenia uniflora</i>	X		X				X		X	
55	Pupunha	<i>Bactris gasipae</i>		X	X					X		
56	Tremoço	<i>Lupinus albus</i> L.		X				X		X		
57	Urucum	<i>Bixa orellana</i> L.	X					X			X	

*Figure 1. Meeting for creation of Project Management Council. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.*

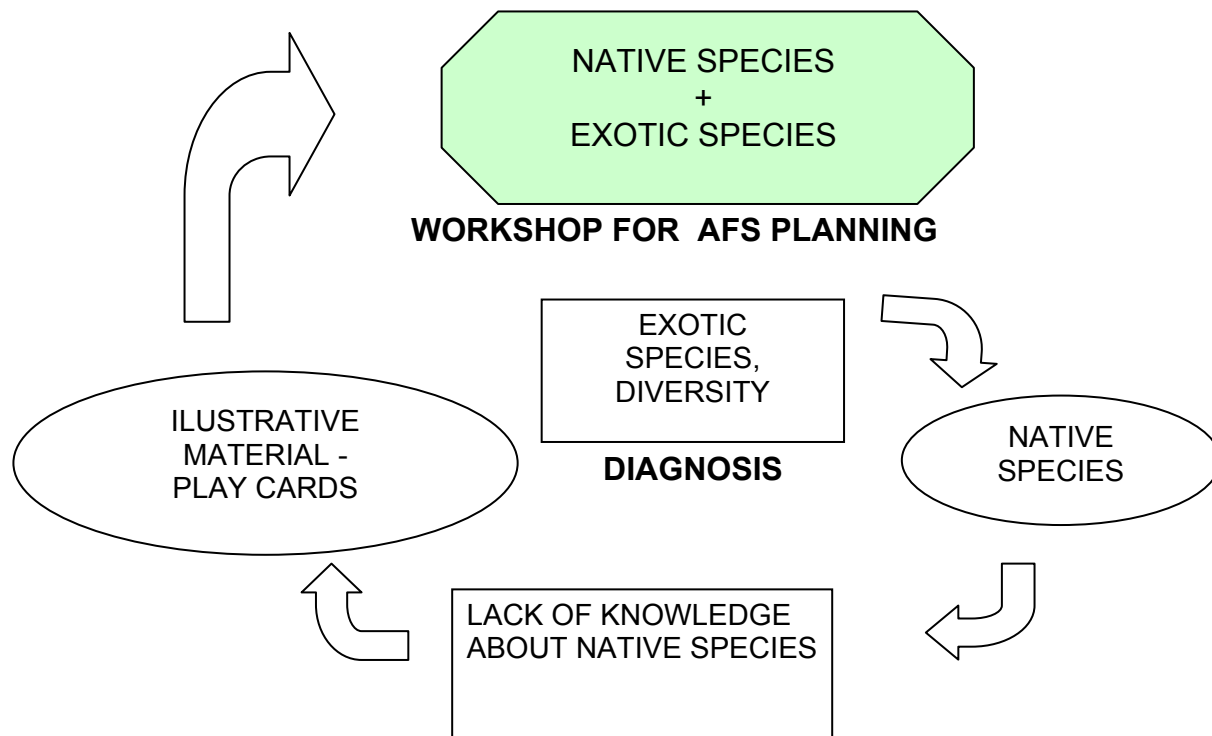


*Figure 2. Exchange visit to Paraty/RJ and to Vale do Ribeira/SP, with the communities of rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.*

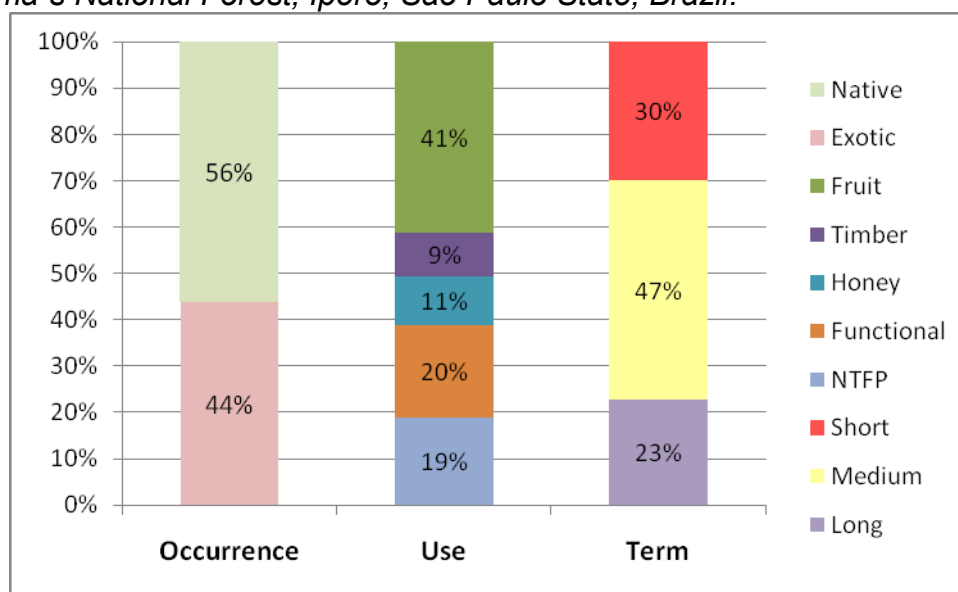




**Figure 3.** Planning strategy for the AFSs and diversification of production. In the square the farmers and monitors opinion, in the circles of the project intervention. In the octagonal figure, the synthesis occurred. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.



**Figure 4..** Species planted by occurrence, use and term. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.



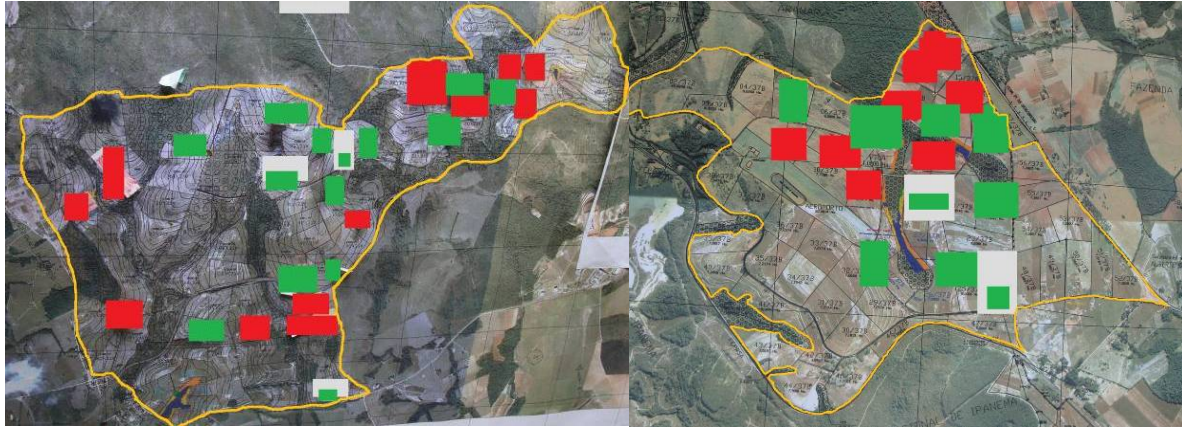
**Figure 5.. Planning workshop of the AFSSs and example of the teaching material. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.**



**Figure 6. Implantation of the demonstrative units of the project. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.**



*Figure 7. Tracts of land from farmers, showing activity participants only (in red), demonstration units (in with) and areas of other farmers (in green) where the project was expanded. Rural settlements of Ipanema's National Forest, Iperó, São Paulo State, Brazil.*



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**APPENDIX:**

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